MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole Log Data Report

Log Event A

Borehole 50-00-03

Borehole Information

Farm :	T	**Tank :**	T	**Site Number :**	299-W11-51
N-Coord :	43,648	**W-Coord :**	75,577	**TOC Elevation :**	677.37
Water Level, ft :	134.3	**Date Drilled :**	9/30/1944		

Casing Record

Type :	Steel-welded	Thickness, in. :	0.237	ID, in. :	4
Top Depth, ft. :	0	Bottom Depth, ft. :	148		
Type :	Steel-welded	Thickness, in. :	0.280	ID, in. :	6
Top Depth, ft. :	0	Bottom Depth, ft. :	148		

Cement Bottom, ft. : 148 **Cement Top, ft. :** 0

Borehole Notes:

Borehole 50-00-03 was drilled in September 1944 and completed to a depth of 148 ft. The drilling log reports that 12-in., 10-in., and 8-in. casings were telescoped during the borehole construction, but all of the casings were withdrawn when the 6-in.-diameter casing was installed from the ground surface to 148 ft. The 6-in. casing was pre-perforated and slotted between 50 and 148 ft. Drilling records indicate that a cement (grout) plug was placed at the bottom of the borehole. This borehole was modified when a 4-in. casing was placed inside the 6-in. casing. Grout is also assumed to be present between the inner and outer casings after the borehole was modified.

The zero reference for the SGLS was the top of the 4-in. casing, which is approximately even with the ground surface.

Equipment Information

Logging System :	2B	**Detector Type :**	HPGe	**Detector Efficiency:**	35.0 %
Calibration Date :	10/1997	**Calibration Reference :**	GJO-HAN-14	**Logging Procedure :**	MAC-VZCP 1.7.10-1

Logging Information

Log Run Number :	1	**Log Run Date :**	07/09/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	0.0	**Counting Time, sec.:**	200	**L/R :** L	**Shield :** N
Finish Depth, ft. :	9.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

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Log Run Number :	2	**Log Run Date :**	07/13/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	8.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :** N	
Finish Depth, ft. :	39.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	3	**Log Run Date :**	07/14/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	38.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :** N	
Finish Depth, ft. :	96.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a
Log Run Number :	4	**Log Run Date :**	07/15/1998	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	139.0	**Counting Time, sec.:**	200	**L/R :** L **Shield :** N	
Finish Depth, ft. :	95.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged in four log runs. The total logging depth achieved by the SGLS was 139.0 ft. A water level indicator measured standing water at 134.3 ft.

Analysis Information

Analyst : R.R. Spatz

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 12/02/1998

Analysis Notes :

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the calibration spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

The casing correction factor for a 0.517-in.-thick steel casing was applied to the concentration data during the analysis process. A grout correction was not made because none is available. A general water correction factor was applied to the water-filled interval in the bottom 5 ft of the borehole.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available

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digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A time-sequence plot of selected historical gross gamma-ray data collected between 1975 and 1993 is also included.

Results/Interpretations:

The radionuclide concentrations identified in this section are reported as apparent concentrations only and are underestimated.

The only man-made radionuclide detected in this borehole by the SGLS was Cs-137. Cs-137 contamination was detected continuously from the ground surface to 2.5 ft at concentrations ranging from 0.3 to 10.4 pCi/g. At 38, 66, and 99.5 ft, isolated Cs-137 contamination was detected at 0.2 pCi/g. From 128 to 139 ft (the bottom of the logged interval), continuous Cs-137 contamination was detected at concentrations ranging from 0.2 to 0.7 pCi/g. The maximum Cs-137 concentration in this borehole was 10.4 pCi/g measured at 1 ft.

The plot of the naturally occurring radionuclides shows the K-40 concentrations from the ground surface to 53 ft are very uniform at about 10 pCi/g and may be related to the borehole construction rather than lithologic features. Grout is probably causing the uniform K-40 concentrations measured in this interval. Grout also obscures the contact between the backfill material and the undisturbed Hanford formation at about 39 ft. The higher K-40 and Th-232 concentrations detected between 79 and 87 ft probably represent the depth interval of the early Palouse soil. The decrease in the K-40 concentrations between 91 and 107 ft probably represents the depth interval of the Plio-Pleistocene unit. The top of the Ringold Formation is probably located at 108 ft, where the K-40 concentrations increase slightly.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank T-101.